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Animal bones from medieval and early modern Saami settlements in Finnish Lapland

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Abstract

Publication of the rich medieval and early modern bone material excavated in Finnish Lapland over the past decades is long due. Bone assemblages can complete the picture of the life and livelihood of the early Saami societies presented in written sources. The data from three Saami dwelling sites and two market places, which are published here, support in many ways the written information, but show also some discrepancies between these two sources of information. The osteological data may raise more questions than they answer, but serve as an important source material for further research.

Keywords: Osteology, archaeological bones, Saami, reindeer, middle ages, economy

Introduction

Information about the livelihood of the medieval and early modern Saami communities in Finland is largely based on written sources. The famous works by Fellman (1907), Itkonen (1948a; 1948b) and Paulaharju (1922, 1927) are often used. However, these written sources describing the life and livelihood of Saami people during the period from medieval to early modern times, are often inaccurate and include many generalizations and misunderstandings (Lehtola 1997). The picture provided by the ethnographic literature is deficient, and archaeology is often the main method for studying the lives of Saami people in the past (Carpelan 1991). The largest find complex of the excavated sites is usually bones of animals utilized at the site. However, these rich bone materials from early modern sites in Finnish Lapland have not yet been fully exploited in research. Osteological data were used in a study discussing everyday life at two Saami market places, Markkina in Enontekiö and Pappila in Utsjoki (Lahti 2006; Harlin 2008a; Harlin 2009). Halinen (2009) discusses the Saami dwelling sites and their economies, but the associated osteological material is not included in detail. The osteological materials from Juikenttä were briefly mentioned by Carpelan (1992: 37).

Of all medieval and early modern sites in Norrland, Sweden, studied by Ekman and Iregren (1983), only Paulundsvallen in Lycksele contained a more significant number of unburnt bones. Further north, one mid-17th century silver mining community, Silbojokk, has been studied osteologically (Sten 1989). Since the Saami were transporting the goods to the community, the refuse fauna from the site reflects, to a large extent, the life and traditions of this ethnic group and, to a smaller extent, the life of the settlers (Sten 1989). On the Norwegian coast, by the Arctic Ocean, at a site called Gæccevaj'njar'ga 244 B, a medieval *goahti* (traditional Saami dwelling) has been studied osteologically (Hambleton & Rowley-Conwy 1997).The *goahti* provided a rather large bone material from a limited time period and was used to investigate the nature of the Saami economy at this point of time. In the Norwegian Arctic inland by Lake Vaggetem in Øvre Passvik (northeastern Norway) a 17th century house ground was studied to obtain a clearer picture of the eastern Saami population, their economy and their culture (Berg 2000; Magnell 2002).

In this paper we introduce the osteological data from three medieval – early modern Saami sites, Juikenttä and Autiokenttä 1 in Sodankylä/Soađegilli (northern Saami), and Nukkumajoki/Oađđiveadji 2 in Inari/Anár as well as from two winter markets, Pappila/Páhppal in Utsjoki/Ohcejohka and Markkina/Márkan in Enontekiö/Enodat. Our main aim is to make these analyses available for researchers studying the early livelihoods of the Saami, where the osteoarchaeological evidence can provide useful information. We restrict our discussion to the material itself; a major comparison of the osteological data versus ethnographic evidence and discussion of Saami identity and how it evolved in the past (e.g. Ojala 2009; Aikio 2012) are not the focus of this paper.

Saami villages and markets

The sites discussed in this paper are shown in Figure 1. Sodankylä lies in forest region of Lapland, Inari and Enontekiö near the boreal forest tree line, and Utsjoki clearly in the fell region. In

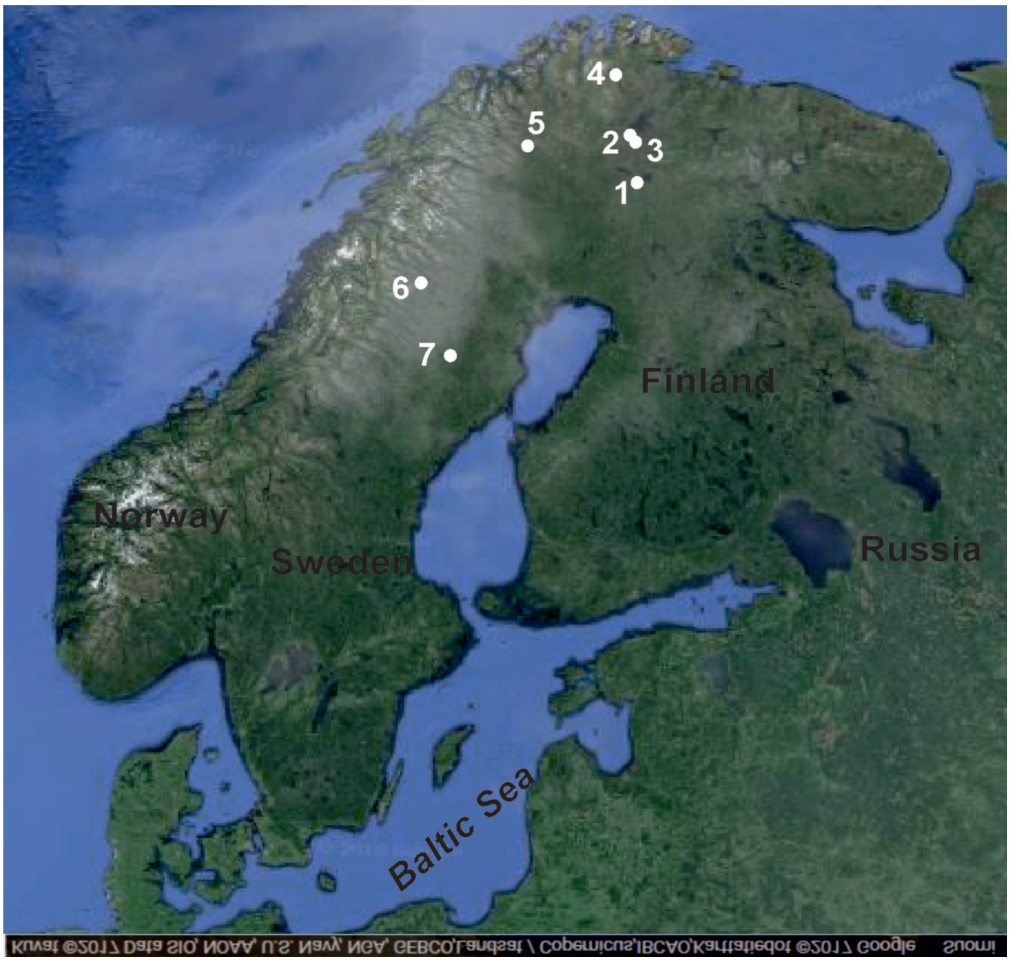

Figure 1. Medieval and early modern sites in northern Lapland discussed in the paper:

1 = Juikenttä in Sodankylä,
2 = Nukkumajoki in Inari,
3 =Autiokenttä 1 in Sodankylä,
4 = Pappila in Utsjoki,
5 = Markkina in Enontekiö,
6 = Silbojokk in Arjeplog,
7 = Paulundsvallen in Lycksele.

the whole area, the mean annual temperature lies below 0°C, and the mean snow depth is around 60–80 cm. The precipitation is highest in Sodankylä (Finnish Meteorological Institute (https://en.ilmatieteenlaitos.fi; read 16.8.2017).

Sodankylä Juikenttä (later Juikenttä) is the earliest of the five sites studied. The site was occupied by Kemi Saami from the Middle Ages to early modern times (AD 1050–1650) during the spring and early summer, as well as possibly also during the late summer (Carpelan 1987). These summer villages were situated near larger lakes or rivers, and fishing and fowling played important roles in the subsistence. According to written sources reindeer (*Rangifer tarandus*) herding was not generally practised in this area in the early phases of the studied time span. For example, in the reindeer register of Carl IX from 1609, only approximately twenty herders in current Utsjoki parish are listed with flocks with a maximum of twenty reindeer (see Hultblad model in Hansen & Olsen 2004: 206, fig. 40). In 1750, the number of taxed reindeer in Utsjoki area was several thousands (Itkonen 1948b: 115–7 and references within).

Reindeer were, however kept as draught animals. This is also suggested by the artefacts found during excavations (Carpelan 1987). The bone material from Sodankylä Juikenttä comes from a separate area not far from the Saami dwelling, *goahti*.

Inari Nukkumajoki 2 (later Nukkumajoki) is part of a series of large winter villages, occupied by the Saami during the 15–16th centuries (Carpelan 1991; Carpelan et al. 1994). Large quantities of bone were collected around the dwellings, along with bone and iron artefacts. Some artefacts suggest

that the reindeer were not only hunted but also used as draught animals at this site (Carpelan 1991).

Sodankylä Autiokenttä 1 (later Autiokenttä) is the most recent of the studied Saami sites. It was occupied by Saami during the 17–18th centuries (Honkanen 1982), during a time when plague had diminished the domestic reindeer stock and the wild reindeer populations were growing (Paulaharju 1922; Itkonen 1948b: 93). The bone material of Autiokenttä comes from the cultural layers around and inside of a cottage and a *goahti* (Honkanen 1982).

Utsjoki Pappila (later Pappila) is located by the lake Mantojärvi/Máttajávri, which is a backwater of the Utsjoki/Ohcejohka river. The site was occupied between the 17th and 18th centuries based on the coins and clay pipes found in excavations. According to written sources, markets were already held at the Pappila site in 1640. The annual markets, taxation and court sessions here occurred at the end of February. A church was erected at the site in 1701 (Itkonen 1948a: 303; 1948b: 59). The Pappila site became the center for the Utsjoki siida (a Saami village, a traditional administration unit) and a center of trade for Tornio merchants or burghers. By 1820, the market came to an end due to competition from the nearby Arctic Ocean markets, such as Tanabru and Mortensnes, and the inland market site Inari (Itkonen 1948a: 206–8; 1948b: 203). According to written sources most of the Utsjoki siida practised reindeer herding in the 17th century. Otherwise, the subsistence was based on hunting. By the 18th century some of the inhabitants had cows and sheep. Agriculture was mainly pursued in the Teno area (Itkonen 1948a: 236; 1948b: 287). Fishing was practised on the Norwegian coast during the summer, and inland lakes were used in winter. Salmon fishing occurred on the river Teno, four kilometres from the site, or on its tributaries during spring, summer and autumn (Itkonen 1948a: 285).

The excavated area was limited to two *goahti* and a small area outside these structures. Adjacent to *goahti* 2, there was a smaller structure, i.e., a so-called *buvri*, which used to be built as storage rooms or shelter for sheep or goats. If this structure can be interpreted as an animal shelter, it can imply an extended occupation at this site. At least this was the case among nomadic reindeer Saami in Deavddesvuopmi in Indre Troms, Norway. According to interviews, done in the 1990´s the Saami rented goats from the pesants in the spring and returned them in September. *Buvris* were built for this purpose (Sommerseth 2005: 100).

Enontekiö Markkina (later Markkina) lies at the confluence of three rivers. It was established as a market place by a royal order of King Carl the IX in 1604, and a church was erected there, probably in 1607. The Swedish crown controlled the taxation and markets from then on (Grape 1803: 219; Korpijaakko 1989: 139–141). Yearly markets were held at the site from the end of January to the beginning of February, which is also when taxation, annual court sessions and church services occurred (Bergling 1964: 129, 161–4). Markkina was the center of three siida – Rounala/Ruovdnal, Suonttavaara/Suovditvárri and Peltojärvi/Bealdojávri (Korpijaakko-Labba 1999: 103) - and an important market place for the Tornio burghers (Bergling 1964: 167; Clarke 1997: 258–287). According to written sources, the population of the Rounala *siida* already practised reindeer herding at the end of the 17th century, while that of Suonttavaara began herding at the beginning of 17th century, and finally, that of the Peltojärvi *siida* started herding

by 1750 (Korpijaakko 1989: 132–6). The site was abandoned in 1826 when the church was moved further south (Itkonen 1948a: 73). The bone material comes from two cottages and three *goahti.* The site has been dated with the help of coins, clay pipes and dendrochronology.

Material, methods, and limitations of the data

The material used in this study consists of more than 20 000 analyzed bone fragments from 12 excavations (later samples) in the five villages and markets under study (Table 1 and Figure 1). The rich excavated bone material from Nukkumajoki (ca. 500 kg) as well as the fish scales from Juikenttä have been only partially analyzed. Our data are based on reports of osteological analyses carried out over several years by the authors, and other osteologists (Table 1). However, the bird bones from Juikenttä and Autiokenttä were reanalyzed for this paper (K. Mannermaa) and the results given here are based on these new analyses. Unfortunately, the bird material excavated from Markkina (Cottage 1, KM 26965) was not available for new analyses. Bird remains from different sites have been treated here as entities and materials from identifiable activity units (for example *goahtis*) have not been separated. Part of the material from Enontekiö and Utsjoki has been published previously by the first author (Lahti 2006).

All samples were highly fragmentary, since the long bones, phalanges and mandibles were chopped to extract bone marrow (Figure 2). Otherwise, the bones were fairly well preserved, showing little or no erosion.

The bones were analyzed morphologically by comparing them with modern skeletons in the collections of the Zoological Museum of the Finnish Museum of Natural History in Helsinki. In the new bird bone analyses, the identifications

Table 1. Early modern Saami sites included in the study. KM = The National Museum of Finland, Archaeological collections; SUG = The National Museum of Finland, Finno-Ugrian collections; NISP = Number of identified specimens; x = Fish scales, not counted. The osteological reports are stored in the archives of the Finnish Heritage Agency as well as at nba.fi.

Studied sites	Museum	Cat. no.	Structure	Excavator	NISP	Osteological analysis
Sodankylä 014 Juikenttä	SUG	5577	Separate pit	Carpelan 1962	1306	Ukkonen 1997a
Sodankylä 014 Juikenttä	SUG	5606	Separate pit	Carpelan 1964	541	Blomqvist ?; Mannermaa 2008a
Sodankylä 014 Juikenttä	SUG	5606	Separate pit	Carpelan 1964	11	Ukkonen 1997b
Sodankylä 014 Juikenttä	SUG	5625	Separate pit	Carpelan 1965	1231	Blomqvist ?; Mannermaa 2008b
Sodankylä 014 Juikenttä	SUG	5625	Separate pit	Carpelan 1965	x	Ukkonen 1997c
Inari Nukkumajoki	KM	20278	*Goahti*	Carpelan 1978	1880	Fortelius 1981
Inari Nukkumajoki	KM	20583	*Goahti*	Carpelan 1979	3490	Ukkonen 1996a
Sodankylä Autiokenttä 1	KM	20585	*Goahti* and cottage	Honkanen 1979	483	Ukkonen 1996b; Mannermaa2008c
Utsjoki Pappila	KM	33944	*Goahti* 1	Karjalainen 2003	3666	Lahti 2004
Utsjoki Pappila	KM	34678	*Goahti* 2	Karjalainen 2004	2803	Lahti 2005
Enontekiö Markkina	KM	25717	*Goahti* 2,3,4	Halinen 1990	2675	Ukkonen 1990
Enontekiö Markkina	KM	26965	Cottage 1	Halinen 1991	1815	Ukkonen 1991
Enontekiö Markkina	KM	32131	Cottage 2	Halinen 2000	194	Lahti, Mannermaa 2002a
Enontekiö Markkina	KM	32854	Cottage 2	Halinen 2001	525	Lahti, Mannermaa 2002b
				Total	20620	

Figure 2. Marrow-split reindeer phalanges, metacarpals, metatarsals and tibia from Inari Nukkumajoki 2 (KM 37149: 615). Photo Eeva-Kristiina Harlin.

of capercaillies (*Tetrao urogallus*) and black grouse (*Tetrao tetrix*) were based on morphological features and bone measurements (Erbersdobler 1968). Literature (Bacher 1967; Woelfle 1967) was used to aid in the identification of ducks (Anatinae), geese (Anserinae) and swans (*Cygnus* sp.). The species identification of young birds was based on the morphology, size and structure of the bone.

The NISP (number of identified specimens) was counted for all species and species groups. For reindeer and some bird species, the MNI (minimum number of individuals) was also calculated based on the amount of the most frequent non-replicated elements of these materials. Comparing MNI and MNE (minimum number of elements) would show if whole carcasses are present in the material or if some body parts are missing. This is very helpful when assumptions are made about the function of the site (Humbleton & Rowley-Conwy 1997: 57, Lyman 1994: 205–215). Unfortunately, the MNE was not calculated in most of the analyses.

The ages of the reindeer were roughly estimated based on the presence of deciduous teeth vs. M_3 (Bromée-Skuncke 1952) and the wear of the latter, as well as epiphyseal fusion following Hufthammer (1995). Hufthammer's data are derived from wild Norwegian (mountain) reindeer. These data are not directly applicable for assessing the ages of wild or semidomestic Finnish (mountain) reindeer, and the age assessments from the epiphyseal data have to be considered as estimates only. Unfortunately, not all samples contained the necessary information

for these estimations. Too few specimens could be sexed to give any reliable information about the proportions of males to females among the slaughtered animals. Among the birds, the sex assessments of the capercaillie and the black grouse were based on the sizes of the bones.

The basic challenge when using analyses from several excavation sites, apart from the differences in excavation techniques and documentation, is the difference in methods used by individual osteologists. For example, osteometry was not a routine part of the original analyses, or if it was, the material included only a few measurable bones. One exception is Nukkumajoki 2 (KM 20278), where measurements were taken from several specimens, with astragali being the largest group of measured elements. However, one example of this challenge is that cutmarks have been documented only in a part of the analyses. Differences in the excavation techniques, documentation, and osteological methods, especially affect the quantitative results of the analyses. Some species groups, such as those of birds and fish, are often underrepresented in the analyses. The same applies to certain parts of the mammalian skeleton, such as the ribs and vertebrae. These differences limit the interpretation of the data, and make comparisons between the sites difficult.

Results

Mammals

Mammalian species found at the sites are given in Table 2. Reindeer – wild or semi-domestic – dominate the bone material at all sites. Wild mammals, such as wolf (*Canis lupus*), red or Arctic fox (*Vulpes vulpes/Alopex lagopus*), brown bear (*Ursus arctos*), wolverine (*Gulo gulo*), pine marten (*Martes martes*), European elk (*Alces* alces), Eurasian beaver (*Castor fiber*), red squirrel (*Sciurus vulgaris*), Norwegian lemming (*Lemmus lemmus*) and Arctic hare (*Lepus timidus*), are found occasionally in the samples. The water vole (*Arvicola terrestris*) found is probably from a later age; the species is known for its burrowing habits and is often found in refuse pits and middens as secondary deposit material. One seal (Phocidae) bone, the fourth metatarsus from the foot, was identified at Juikenttä. This is the only seal find in the studied materials.

Cattle (*Bos taurus*) and sheep/goat (*Ovis aries/Capra hircus*) were present at Autiokenttä and the two market places Pappila and Markkina. Two pig bones (*Sus scrofa domesticus*) were found at Autiokenttä. Dog (*Canis familiaris*) remains seem to have been deposited only at Juikenttä. However, dog bite marks are present on reindeer bones from another excavation in Nukkumajoki (Harlin 2008b; analysis not available for this study).

Reindeer

NISP and the MNI of reindeer in all samples are given in Table 3.

Elements. Anatomical representations of reindeer bones are given in Figure 3 and Figure 4. Certain parts of the skeleton, such as the ribs, scapula, pelvis, sacral bone, humerus, femur, and patella derive from the meaty parts of the carcass. The radius, ulna, and tibia are also connected with some meat, but the cranium, mandible, atlas, axis, carpal bones, tarsal bones, metacarpus, metatarsus, phalanges, and sesamoidal bones are hardly related to any meat. Among these bones, the metapodial bones and mandibles have special values because of the quantity of fatty bone

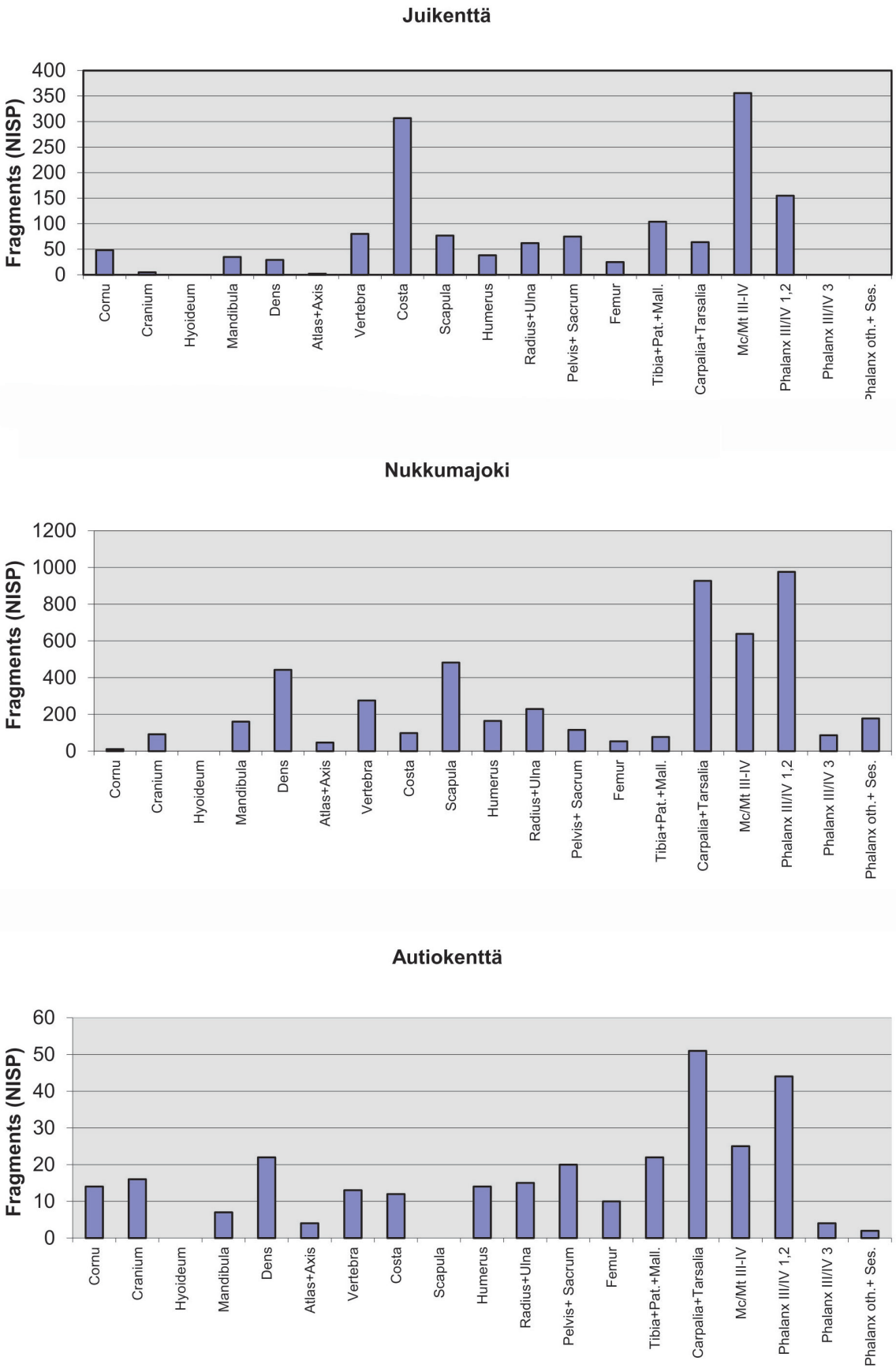

Figure 3. Anatomical distribution of the reindeer bones at the medieval to early modern Saami dwelling sites Juikenttä, Nukkumajoki and Autiokenttä. In the material from Juikenttä, all ribs were identified as being from reindeer, while at the other sites, higher taxa (Ruminantia, Artiodactyla, Mammalia) were used for identification when no specific diagnostic features were present in the ribs.

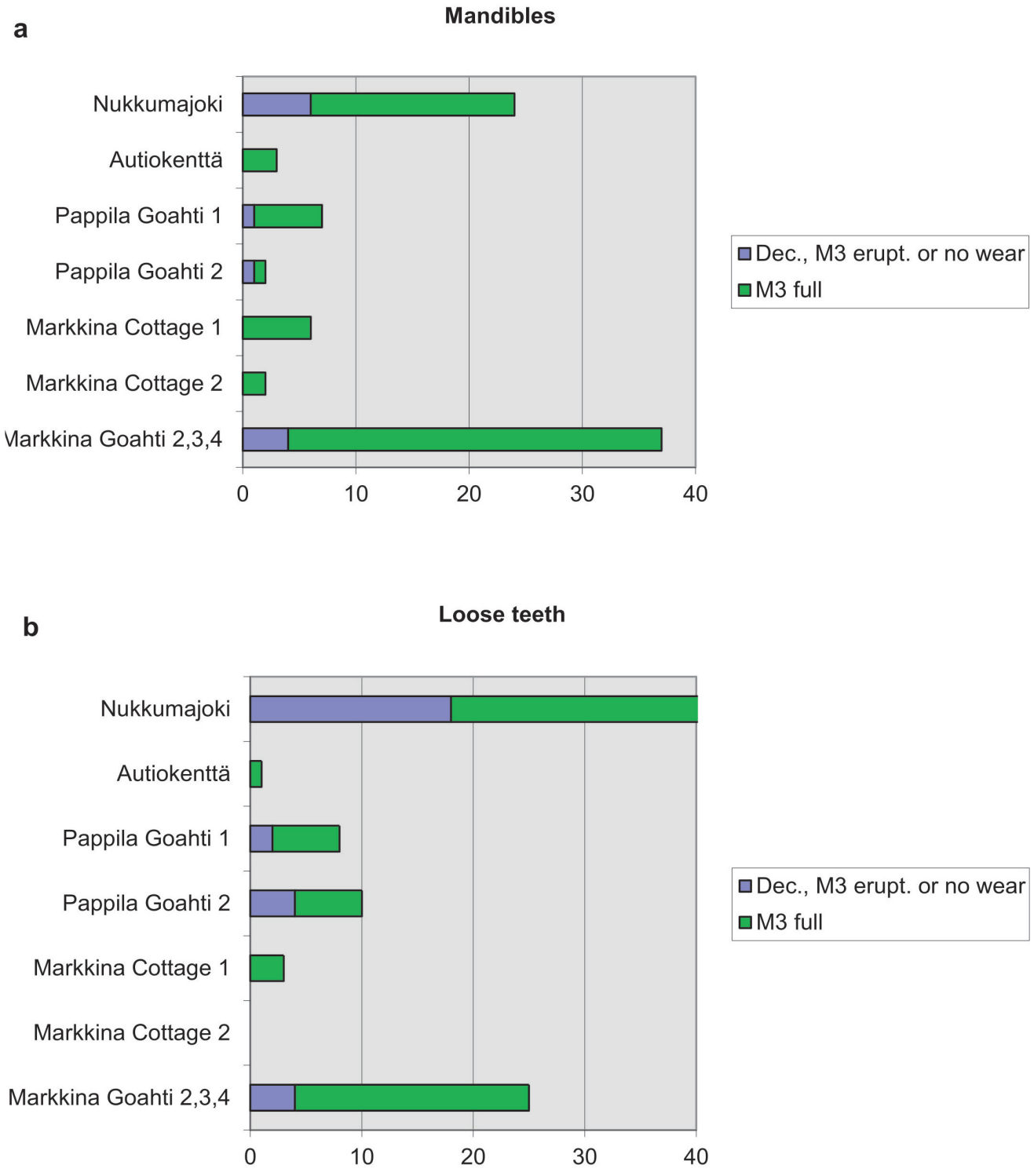

Figure 4. Anatomical distribution of the reindeer bones at the medieval to early modern Saami market places of Pappila and Markkina.

Table 2. Mammalian species identified from bone materials found at the medieval to early modern Saami sites Sodankylä Juikenttä (AD 1050–1650), Inari Nukkumajoki (AD 1480–1580), Sodankylä Autiokenttä (AD 1600–1700), Utsjoki Pappila (AD 1600–1700), and Enontekiö Markkina (AD 1604–1826). Quantification based on NISP (Number of identified specimens).

	Juikenttä	**Nukkumajoki**	**Autiokenttä**	**Pappila**	**Markkina**
Bos taurus (cattle)			56	11	18
Ovis/Capra (sheep/goat)			7	63	49
Sus scrofa (domestic pig)			2		
Canis familiaris (domestic dog)	9				
Canis lupus (wolf)				1	
Vulpes vulpes (red fox)			7		4
Ursus arctos (brown bear)			1		
Gulo gulo (wolverine)	1	1			
Martes martes (pine marten)	1	1			
Phocidae (seals)	1				
Alces alces (European elk)	1			1	14
Rangifer tarandus (reindeer)	1460	5355	301	1927	1604
Castor fiber (beaver)	13	5	1	1	
Sciurus vulgaris (red squirrel)			2		7
Arvicola terrestris (water vole)	1				
Lemmus lemmus (Norwegian lemming)					2
Lepus timidus (Arctic hare)				2	
Total	1488	5362	377	2006	1704

Table 3. Reindeer bones identified from bone materials found at the medieval to early modern Saami sites Sodankylä Juikenttä (AD 1050–1650), Inari Nukkumajoki (AD 1480–1580), Sodankylä Autiokenttä (AD 1600–1700), Utsjoki Pappila (AD 1600–1700) and Enontekiö Markkina (AD 1604 - 1826). KM = The National Museum of Finland, Archaeological collections; SUG = The National Museum of Finland, Finno-Ugrian collections; NISP = Number of identified specimens; MNI = Minimum number of individuals.

Studied sites	**Museum**	**Cat. no.**	**Structure**	**NISP Total**	**NISP *Rangifer***	**MNI *Rangifer***
Juikenttä	SUG	5606	Separate pit	552	435	-
Juikenttä	SUG	5625	Separate pit	1230	1025	-
Nukkumajoki	KM	20278	*Goahti*	1880	1869	44
Nukkumajoki	KM	20583	*Goahti*	3490	3476	62
Autiokenttä 1	KM	20585	*Goahti*, cottage	483	301	6
Pappila	KM	33944	*Goahti* 1	3666	988	19
Pappila	KM	34678	*Goahti* 2	2803	939	13
Markkina	KM	25717	*Goahti* 2,3,4	2675	1392	18
Markkina	KM	26965	Cottage 1	1815	576	11
Markkina	KM	32131	Cottage 2	194	80	5
Markkina	KM	32854	Cottage 2	525	158	3

Table 4. Number of reindeer antler fragments identified from bone materials found at the medieval to early modern Saami sites Sodankylä Juikenttä (AD 1050–1650), Inari Nukkumajoki (AD 1480–1580), Sodankylä Autiokenttä (AD 1600–1700), Utsjoki Pappila (AD 1600–1700) and Enontekiö Markkina (AD 1604–1826).

Site	Skull with antlers	Skull with shed antlers	Shed antlers	Antler fragments
Juikenttä (KM 5606)	0	?	?	17
Juikenttä (KM 5625)	1	?	?	31
Nukkumajoki 2 (KM 20583)	0	3	0	5
Nukkumajoki 2 (KM 20278)	0	2	0	6
Autiokenttä (KM 20278)	0	3	1	13
Pappila (KM 34678)	1	0	0	12
Pappila (KM 33944)	1	0	1	22
Markkina (KM 26965) Cottage 1	3	0	0	23
Markkina KM 32131, 32854) Cottage 2	2	0	0	56
Markkina (KM 25717) Goahti 2	0	0	0	4
Markkina (KM 25717) Goahti 3	2	0	0	10
Markkina (KM 25717) Goahti 4	0	0	1	10

marrow in them. Additionally, cloven hoofs are of increased value due to their thick fat layers.

Bones from all body parts were found at all of the sites. Lower parts of the extremities (carpals and tarsals, metapodial bones and phalanges) are typically the most abundant elements at all sites. At Pappila, an exceptionally high proportion of femurs is noted. However, the proportion of humeri here is approximately the same as at the other sites. Pappila and the *goahti* from Markkina show notably high proportions of mandibles and teeth in comparison to those of the other sites. In Juikenttä, the proportions of carpals and tarsals are exceptionally low, and the proportion of ribs is high. This particularity may be due to different analysis practices: at other sites, ribs were not identified by species, but higher taxa (Ruminantia, Artiodactyla, and Mammalia) were used when no specific diagnostic features were present.

Age and size. Based on teeth eruption and wear, most of the slaughtered animals were young adults. Individuals with deciduous teeth, M_3 just erupting or M_3 without any wear (younger than sixteen months; Bromée-Skuncke 1952) were present in all larger samples but were abundant only at Nukkumajoki. Individuals with fully erupted third molars (sixteen months or older) were much more common (Figure 5). There is no noticeable difference between the teeth attached to mandibles and loose teeth. Heavily or totally worn rows of teeth were found only at the market places of Pappila and Markkina (Figure 6). However, the proportions of the different wear stages are quite different when the loose teeth are considered. Teeth wear is known to correlate with the age of an individual but also correlates with the diet (lichen vs. more abrasive hay).

The analysis of the epiphyseal fusion of the bones confirms the scarcity or absence of younger individuals (under eighteen months) among the slaughtered animals (Figure 7), and even the next age group seems small.

The sample with the National Museum of Finland (KM) number 20278 from Nukkumajoki included 44 measurable astragali (Figure 8). Unfortunately, the measuring technique was

different from the methods used today and does not allow for comparisons with data from other Saami sites (Magnell 2002).

Antlers. Surprisingly few antler fragments were identified in the samples, with the only exception being cottage 2 in Markkina (Table 4). Most of the specimens were fragments of the shaft, but some had their proximal ends intact or were attached to a skull. Reindeer bulls shed their antlers in November, after the rutting season. Castrates may, however, retain their antlers over the winter. Cows shed their antlers after calving, approximately in May. The growth of new antlers begins in the spring for both sexes.

At the markets of Markkina and Utsjoki, nearly all identifiable antler basal parts were attached to skulls, and therefore, either they derive from females or castrates or the occupation of the sites was not restricted to the winter months. At the dwelling sites of Autiokenttä and Nukkumajoki, the opposite is true. Here, individuals with shed antlers must have been killed during the first half of the year (males) or during the short period after calving (females). No individuals with shed antlers should be present in a reindeer population during the summer months.

Domestic species

Direct evidence of animal husbandry can be found at Autiokenttä, where a relatively high number of cattle, sheep/goats, and domestic pigs were identified. Domestic species were also present at both market places, Pappila and Markkina, but in very low numbers (Figure 9). Domestic dogs were present only at Juikenttä.

The anatomical distribution of the excavated cattle bones (Figure 10) imply that, at Autiokenttä, not only the meaty parts (ribs, upper extremities) but also the less meaty parts (lower extremities) were used. Furthermore, elements connected with hardly any meat, such as the head and the lowest extremities, are found in the excavated material. The number of cattle bones from Pappila and Markkina is low, but fragments of the skull and mandible, as well as loose teeth, are present at both sites. Most of vertebrae and ribs were identified only by being of the taxa Ruminantia or Mammalia, which explains the absence of these bones in the anatomical presentation.

At Autiokenttä, nearly all sheep or goat bones are derived from the head region (Figure 10). At Pappila and Markkina, the distribution is quite the opposite; bones associated with meaty parts clearly dominate the material.

Birds

The bird species identified in the samples are given in Table 5. The sample from Juikenttä stands out from all other sites in regard to both the number of identified fragments and taxonomic diversity. The predominant species is capercaillie, followed by the whooper swan (*Cygnus cygnus*) and geese. Interestingly, Juikenttä is the only site in our study where whooper swan was identified. In addition to anatid and tetraonid birds the sample from Juikenttä includes species that are not typically identified in the Finnish refuse faunas (Mannermaa 2003), such as the crane (*Grus grus*), the great cormorant (*Phalacrocorax carbo*), and the Northern goshawk (*Accipiter gentilis*).

The material from the Nukkumajoki dwelling site contains hardly any bird bones, and bones identified at Autiokenttä belong almost exclusively to one species, the capercaillie. The bone sample from the market place Pappila

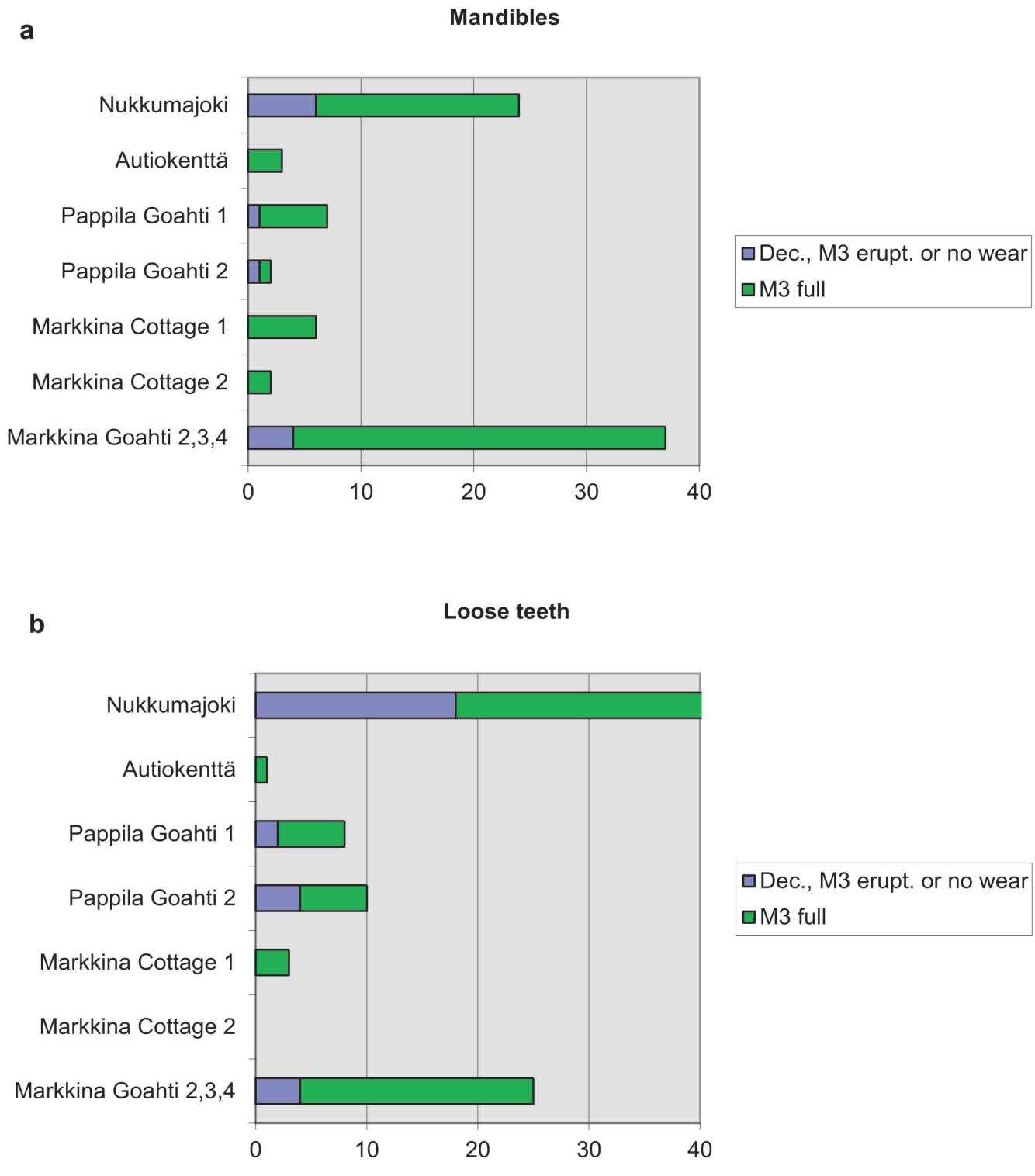

Figure 5. Juvenile reindeer bones in samples from Nukkumajoki, Autiokenttä, Pappila and Markkina. The numbers of deciduous teeth and M3 with no wear are compared to that of fully erupted M3. a = in mandibles, b = loose teeth.

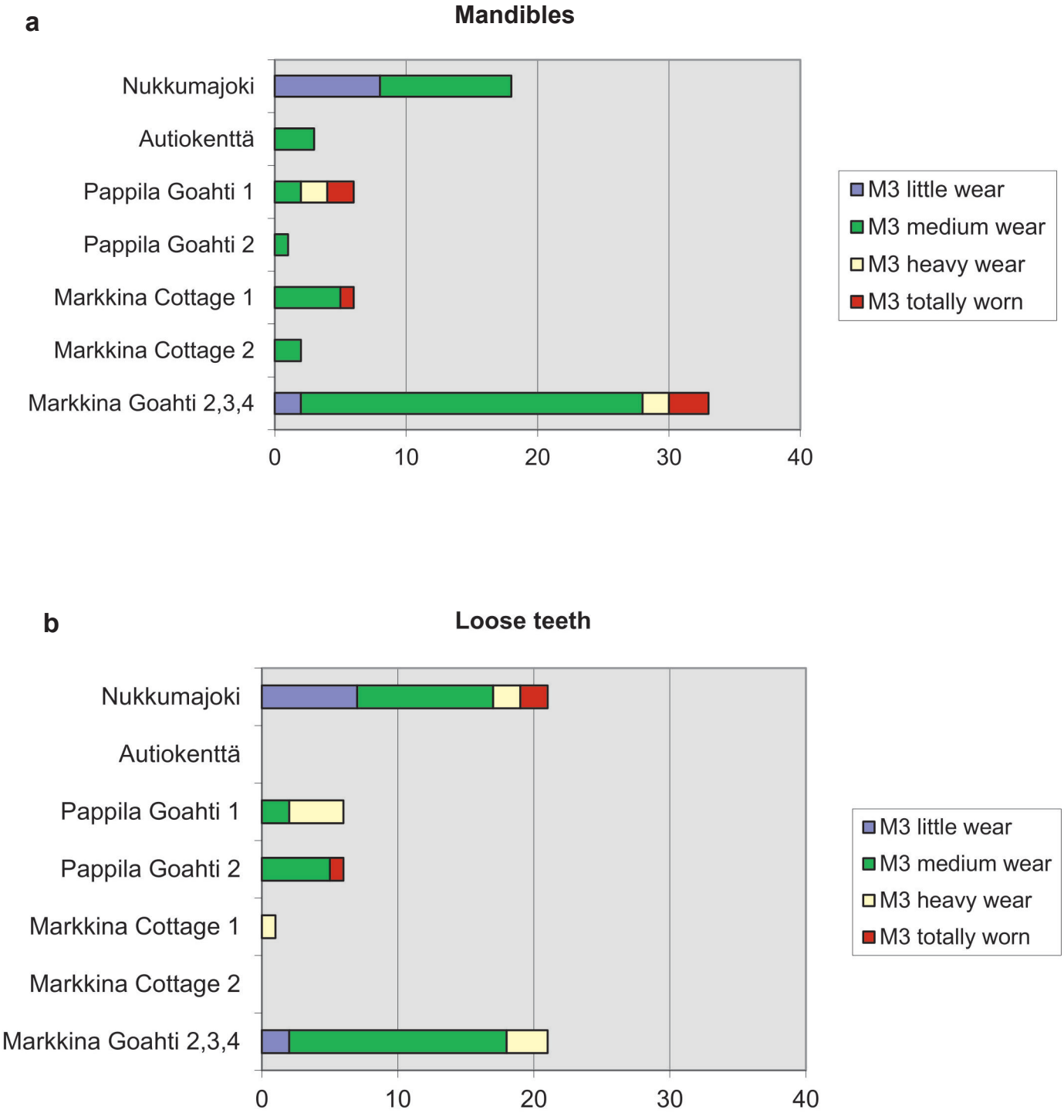

Figure 6. Proportions of the different stages of wear of the reindeer M3 in the bone samples from Nukkumajoki, Autiokenttä, Pappila and Markkina. a = in mandibles, b = loose teeth.

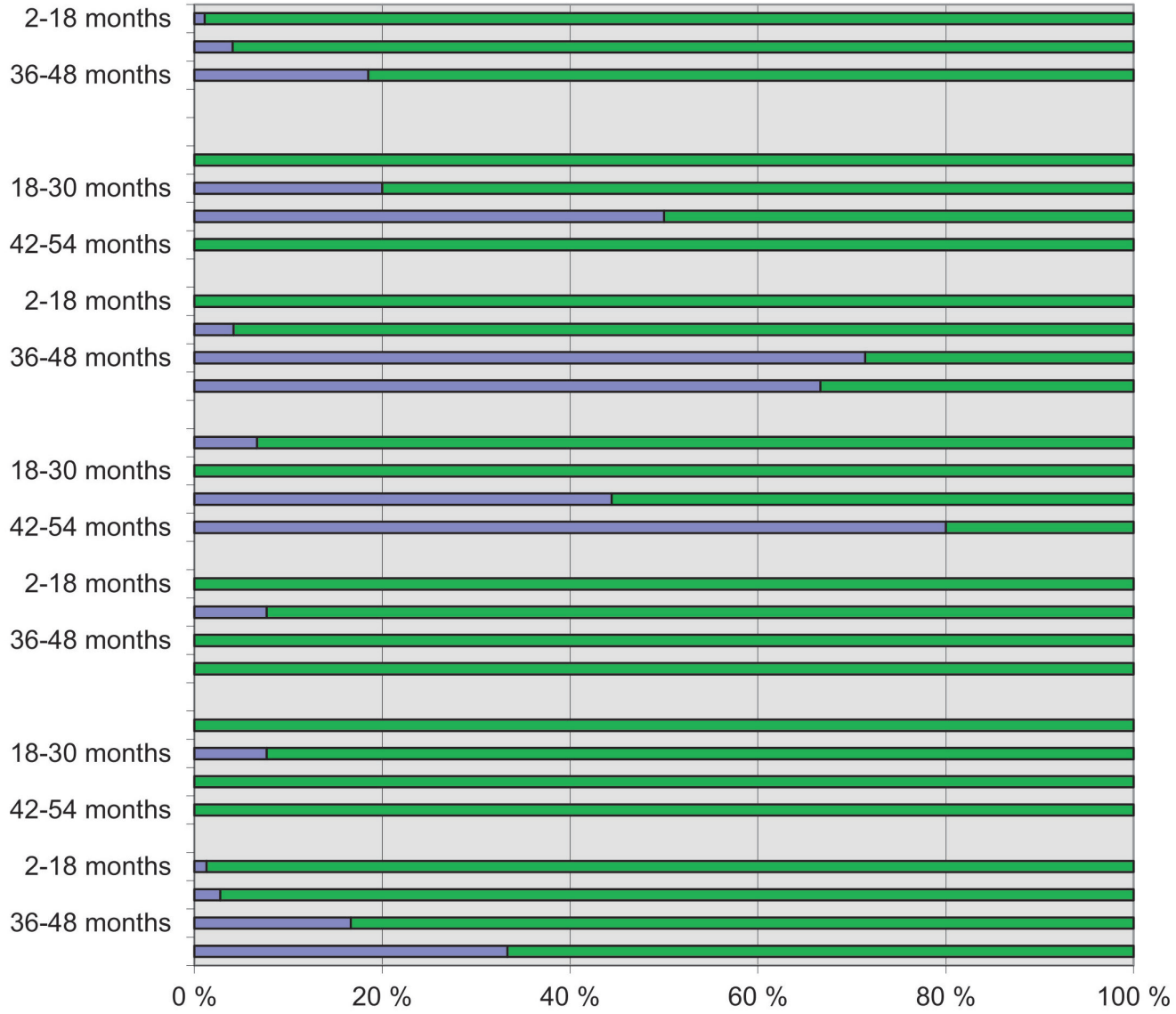

Figure 7. Proportions of unfused/fused epiphyses of the selected elements from the reindeer bone samples from Nukkumajoki, Autiokenttä, Pappila and Markkina. The time-of-fusion is based on Hufthammer (1995).

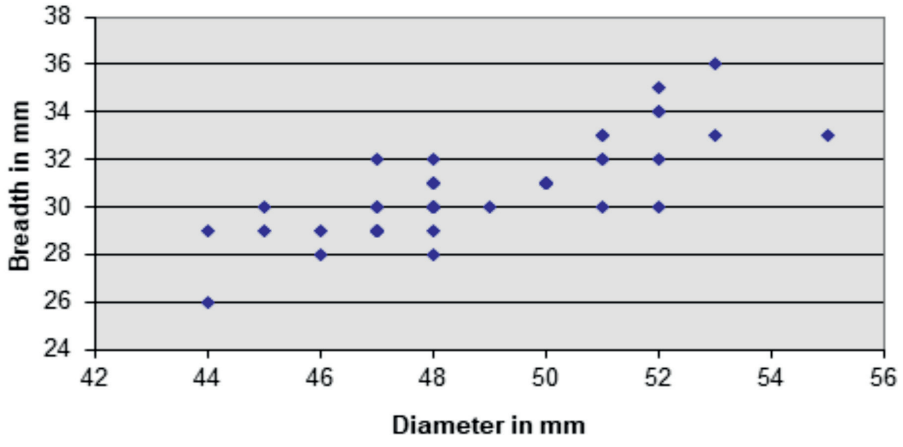

Figure 8. Size distribution of the astragali in the reindeer bone samples from Nukkumajoki.

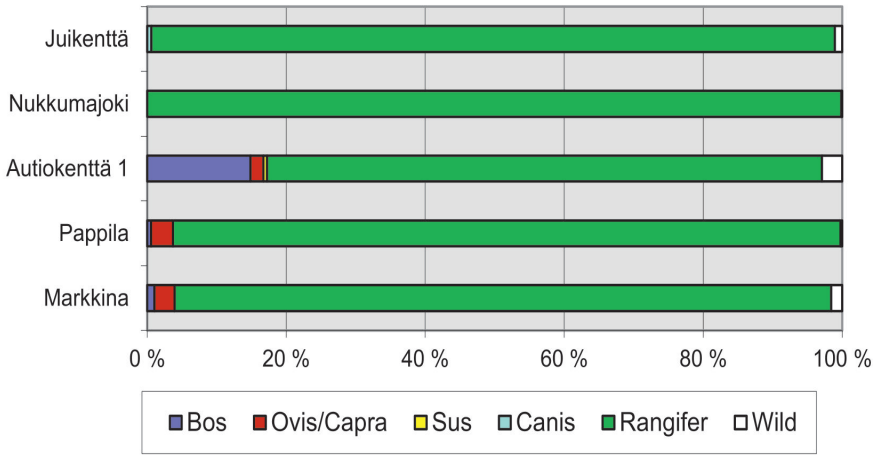

Figure 9. Proportions of domestic animal, reindeer and wild mammalian species in the bone samples from the medieval to early modern Saami sites Juikenttä, Nukkumajoki, Autiokenttä, Pappila and Markkina.

contains practically only bones from the genus *Lagopus* (either willow grouse *L. lagopus* or rock ptarmigan *L. muta*). The material from Markkina contains a high number of bird bone fragments, but the number of species is much lower than in Juikenttä. The main bird groups at Markkina are the genus *Lagopus* and mid-sized ducks.

The anatomical distributions of bird bones from Juikenttä, Autiokenttä, Markkina and Pappila are shown in Figure 11. Nukkumajoki has been omitted from this analysis because of the small size of the sample. Here we have included the 17–18th century Saami site Lycksele in central Sweden (Zachrisson 1976: 87; Ekman & Iregren 1984) in the analysis. In general, bones from the shoulders and wings are the most abundant bones at all sites. The humerus is by far the most common element at Juikenttä and Autiokenttä. It is also common at Markkina and Pappila, but not with the same intensity as at Juikenttä and Autiokenttä. The axial bones and cranium are present but not pronounced at all samples. An exception to this is the number of vertebrae at Markkina and the fragments from the sternum at Autiokenttä and Markkina.

The amount of material from Autiokenttä is small, which may be the ultimate reason for the total absence of some elements. At Juikenttä, however, the reason for the strikingly low number of scapulae must lie elsewhere. In bird bone samples, it is often typical to have a more or less equal number of specimens of the scapulae and coracoidii, as they are tightly connected to each other by ligaments.

Figure 12 shows the anatomical distribution of the elements from different parts of the carcasses in specific taxonomic bird groups. In this analysis, Nukkumajoki and Autiokenttä are left out because of their low sample size. At Juikenttä, the number of wing elements is pronounced for all bird groups, especially for swans and geese. At all other sites, the proportions of leg and wing elements are much more equal.

Sex could be assessed only for six capercaillies (three females and three males), as well as one black grouse (male) from Juikenttä. The sample from Juikenttä included also a handful of bones from juvenile birds. One juvenile bird could be identified as a whooper swan and three as some large species of goose (*Anser anser/Anser fabalis*). No cut marks or other marks which could imply butchering or other handling methods could be recognized on the bird bones. The surfaces of some of the *Lagopus* bones at Pappila were deformed, which may indicate boiling or chewing.

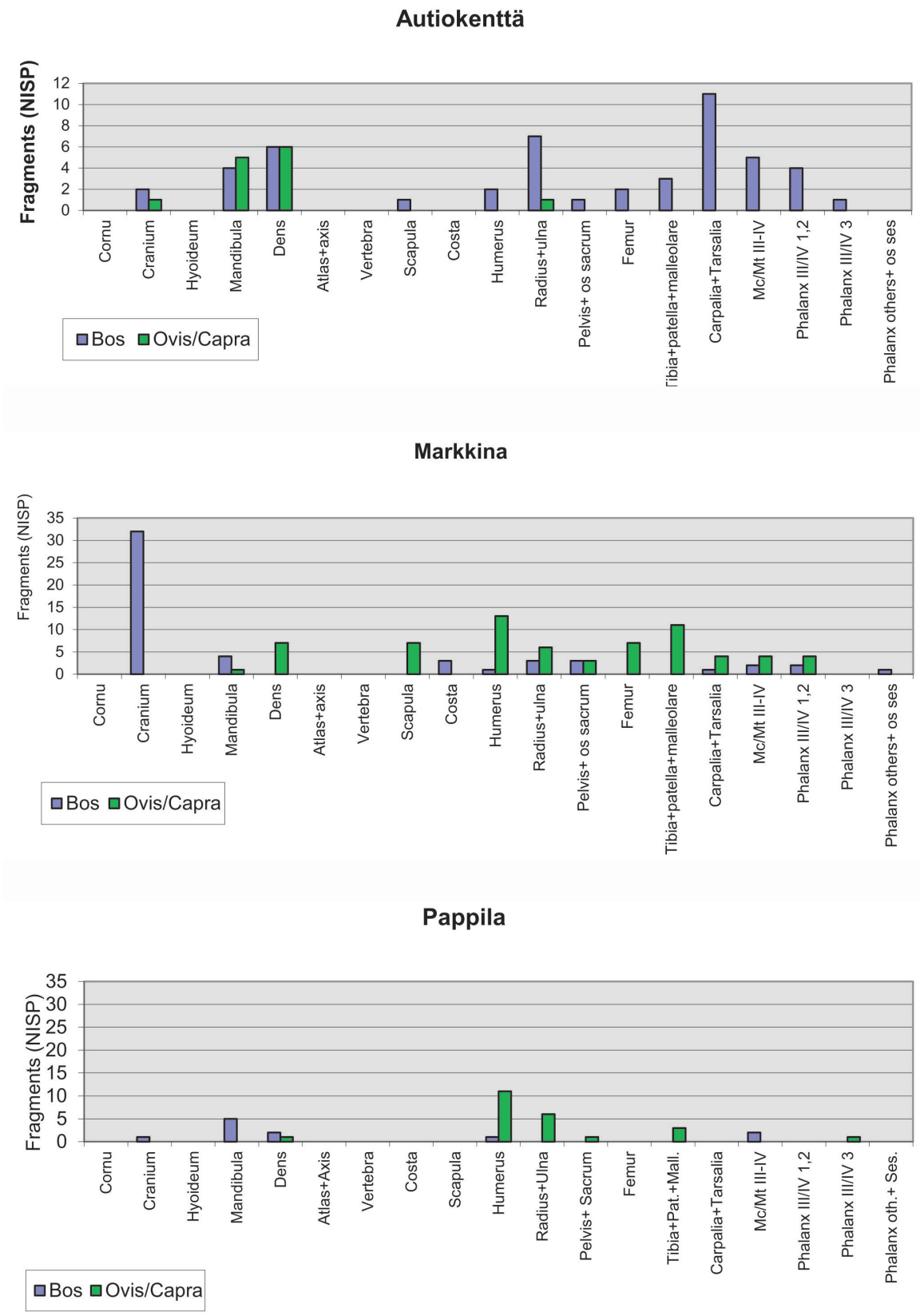

Figure 10. Anatomical distributions of cattle and sheep/goat bones at the medieval to early modern Saami sites Autiokenttä, Markkina and Pappila.

Table 5. Bird species identified from the bone materials found at the medieval to early modern Saami sites Sodankylä Juikenttä (AD 1050–1650), Inari Nukkumajoki (AD 1480–1580), Sodankylä Autiokenttä (AD 1600–1700), Utsjoki Pappila (AD 1600–1700) and Enontekiö Markkina (AD 1604–1826). Quantification based on NISP (Number of identified specimens).

	Juikenttä	Nukkumajoki	Autiokenttä	Pappila	Markkina
Anatidae					
Cygnus cygnus (whooper swan)	66				
Cygnus Cygnus/Anser fabalis/A. anser whoper swan/ greylag goose/bean goose	2				
Cygnus Cygnus/Grus grus (whooper swan/common crane)					
Anser anser/Anser fabalis (greylag goose/bean goose)	41				4
Anser sp. */Branta* sp. (geese)	32				
Anas crecca (teal)	2				
Anas crecca/A. querquedula (teal/garganey)	1				
Anas platyrhynchos (mallard)					2
Anas sp. (indet. duck)					
Clangula hyemalis? (long-tailed duck?)	2				
Clangula hyemalis/Aythya sp. (long-tailed duck/*Aythya*)	1				
Aythya sp. (diving ducks)					6
Mergus serrator (red-breasted merganser)	1				7
Mergus merganser (goosander)	2				
Mergus sp.?	1				
Melanitta nigra? (velvet scoter?)	1				
Melanitta sp. (velvet scoter/common scoter)	1				
Melanitta sp./*Mergus* sp.	1				
Bucephala clangula (goldeneye)	1				1
Anatidae (anatid birds)	22		2	2	96
Tetraonidae					
Bonasa bonasia (hazel grouse)					3
Lagopus lagopus? (willow grouse?)	1				
Lagopus lagopus/L. mutus (willow grouse or ptarmigan)	2			122	110
Tetrao tetrix (black grouse)	7				
Tetrao tetrix? (black grouse?)	2				
Tetrao urogallus (capercaillie)	71	2	37		
Tetrao urogallus? (capercaillie?)	2				
Tetrao tetrix/Tetrao urogallus (black grouse/capercaillie)	7		9		
Tetraonidae (Tetraonid birds)		1		2	
Others					
Gavia arctica (black-throated diver)					1
Gavia stellata (red-throated diver)	1				
Gavia arctica/Gavia stellata (black-throated diver/red-throated diver)	4	1			
Podiceps cristatus/P.grisegena (red-necked grebe/great crested grebe)	1				
Phalacrocorax carbo (cormorant)	1				
Aquila chrysaetos/Haliaeetus albicilla (golden eagle/white-tailed sea-eagle)	2				
Accipiter gentilis? (northern goshawk?)	1				
Grus grus (common crane)	5				
Philomachus pugnax (ruff)					6
Charadriidae (indet. wader)			1		
Aves	5			35	73
TOTAL	**311**	**4**	**49**	**161**	**309**

Fish

Fish are not as abundant in the material as could be expected (Table 6). This may be due to the excavation methods and analysis techniques, such as the excavated soils not being sieved or the small fragments of ribs and vertebrae not being counted. Pike (*Esox lucius*) and perch (*Perca fluviatilis*) are common in the fish material, as at nearly all Finnish archaeological sites. Cyprinid fish are common only at Juikenttä and salmonid fish at Markkina. At both of the market places, Pappila and Markkina, cod (*Gadus* sp.) was also found among the fish bones. The nearest populations of this salt-water fish are found in the North Atlantic and Arctic Oceans, relatively near the sites.

The category Teleostei includes mainly fragments of ribs, fin rays and vertebrae, which were not identified by species. It is possible that the number of salmonids would grow considerably if all vertebrae were analyzed by a fish expert. The preservation of fish bones varies by element and species. Pike, for instance, leave many identifiable fragments from the head region, where as salmon can often be identified only by their vertebrae.

The material from Juikenttä contained vast numbers of fish scales, but only some of them were analyzed. All scales analyzed so far belong to perch.

Discussion

Reindeer hunting or herding

The origin and spread of reindeer herding in northern Fennoscandia is currently a subject of intensive discussion and research (Sommerseth 2005: 97; Bjørnstad & Røed 2009; Bjørnstad et al. 2011; Salmi 2017; Bergstøl 2018; Núñez 2018; Salmi *et al*. 2018). At this point, no consensus has been reached by the researchers (Andersen 2005: 6; Bjørklund 2013: 174–6). In general, the livelihood of the Saami people has evolved from hunting wild reindeer through small scale reindeer herding to full scale reindeer nomadism. These changes are usually associated with changes in the social structure of a society. Hunting was practised in *siida* where the catch was divided between all members. A skilful hunter was a valued member of society, and the desired resource was the hunted animal (e.g. Hansen & Olsen 2004: 203–214). With the transition to reindeer herding, the herded animals became property, which were accumulated by private members of the society. The society became hierarchical, and previously common resources became private (e.g., Ingold 1980; Vorren 1980; Olsen 1984; Hansen & Olsen 2004: 207–8; Andersen 2005: 7).

According to written sources, reindeer herding was practised by *siidas* connected to both markets, Markkina and Pappila, but not by the inhabitants of Juikenttä, Nukkumajoki or Autiokenttä at the time of their occupation (Hansen & Olsen 2004: 40). According to Magnell (2002), in osteological assemblages, a large body size and the dominance of older rather than younger individuals is interpreted as evidence of hunting of wild reindeer, while a small body size and the presence of juveniles is thought to suggest reindeer herding. This is true in a domestic, meat-based economy where mostly young and sub-adult animals are slaughtered (Hambleton & Rowley-Conwy 1997: 68). Earlier, however, the favourable animals to be slaughtered were one and a half years old castrates and old females (Jomppanen & Näkkäläjärvi 2000: 83, Soppela 2000: 93). Hambleton and Rowley-Conwy (1997)

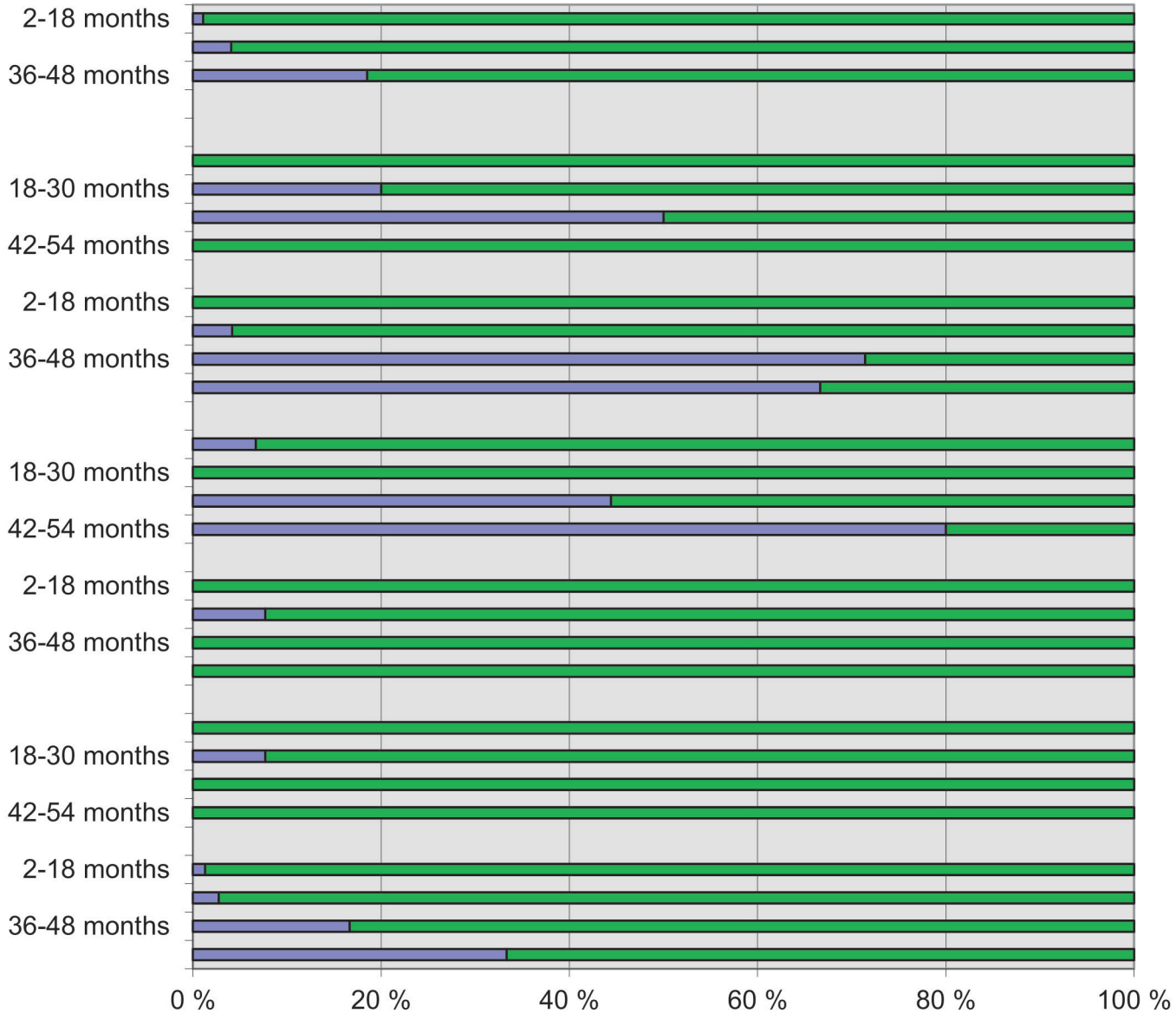

Figure 11. Anatomical distribution (in percent) of the bone types from Juikenttä, Autiokenttä, Markkina and Pappila.

Table 6. Fish species identified from the bone materials found at the medieval to early modern Saami sites Sodankylä Juikenttä (AD 1050–1650), Inari Nukkumajoki (AD 1480–1580), Sodankylä Autiokenttä (AD 1600–1700), Utsjoki Pappila (AD 1600–1700) and Enontekiö Markkina (AD 1604–1826). Quantification based on NISP (Number of Identified Specimens).

	Juikenttä	Nukkumajoki	Autiokenttä	Pappila	Markkina
Cyprinidae (cyprinid fish)	55				
Coregonus sp. (whitefish)		1		1	16
Salmonidae (salmonid fish)		1		35	1
Coregonidae/Salmonidae					49
Esox lucius (pike)	176	9	2	6	9
Gadus sp. (cod)				27	34
Lota lota (burbot)					3
Perca fluviatilis (perch)	58*		3		31
Teleostei	853			151	552
Total	**1142**	**11**	**5**	**220**	**695**

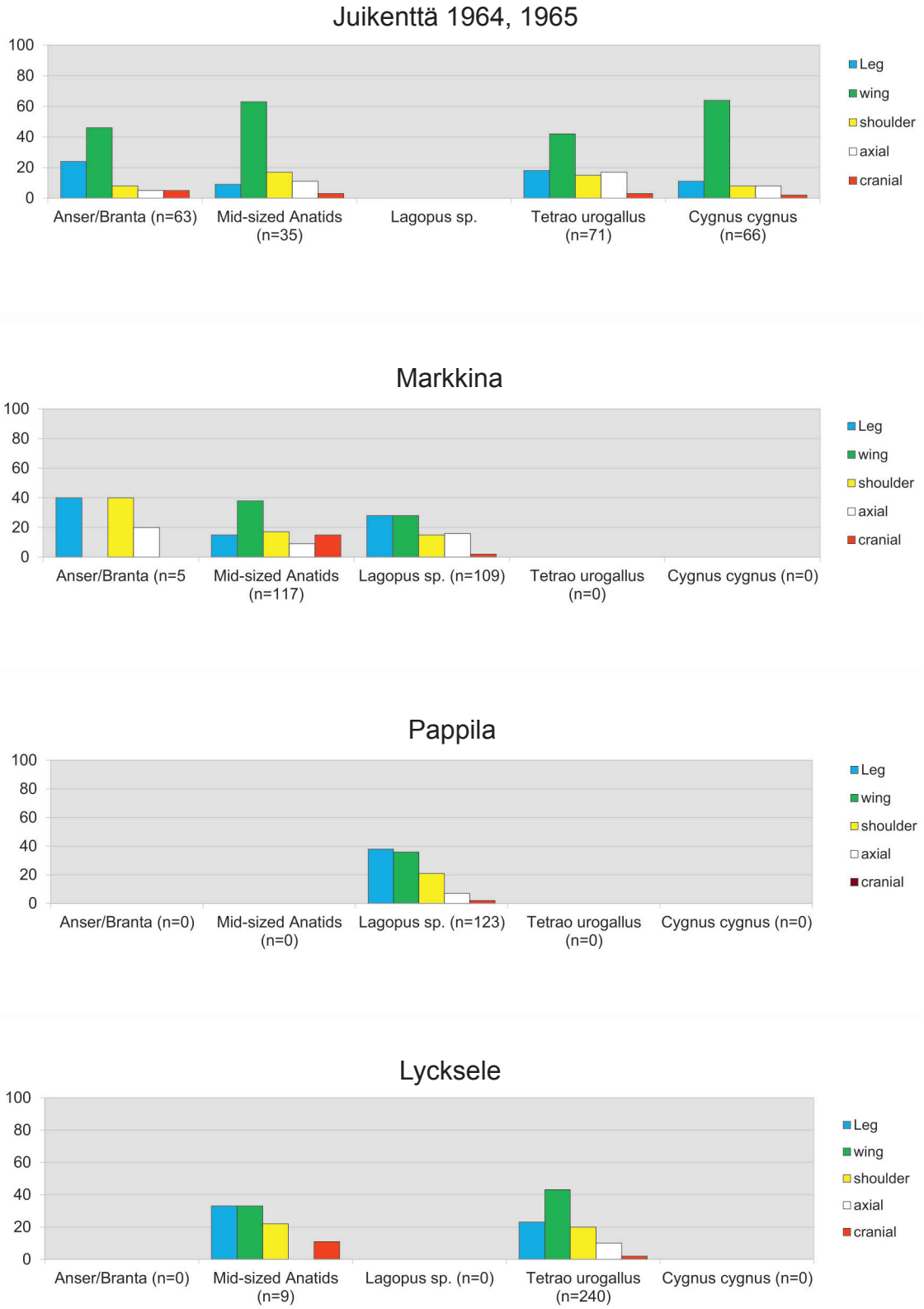

Figure 12. Anatomical distribution (in per cent) of the bird body elements at Juikenttä, Markkina, Pappila and Lycksele. Leg = femur, tibiotarsus, tarsometatarsus; wing = humerus, ulna, radius; shoulder = scapula, coracoid, furcula; axial = vertebrae, synsacrum, sternum; cranial= cranium, dentale, premaxillare, articulare.

also mention the presence of skull fragments and vertebrae as possible evidence of the utilization of tamed animals, whereas their absence could indicate initial butchering outside the camp, as would be expected if wild reindeer were hunted.

Unfortunately, the body size of the individual reindeer could not be estimated due to lack of osteometrical data. The astragali from Nukkumajoki 2 (KM 20278) are of all sizes, and their distribution probably indicates the slaughtering of individuals of both sexes rather than the presence of semi-domestic reindeer, as suggested by Magnell (2002). As to the age structure, based on teeth, young adults dominate at all sites, but juvenile reindeer are also present in all larger bone samples. Fragments of cranium (and vertebrae) have been identified at all sites. This is, however, very weak evidence for reindeer herding.

One distinctive feature in all bone samples in our study, except for those from cottage 2 at Markkina, is the scarcity of antlers. Antlers–in addition to skulls–have traditionally been the most used parts of the skeleton in sacrifices at ceremonial places and burials (Zachrisson 2009). These parts were sometimes taken to *sieidi* sites and graves (Harlin 2007; Harlin & Ojanlatva 2008; Äikäs et al. 2009; Mulk 2009) and therefore, are perhaps not abundant at settlement sites (see also Lahti 2006a). Antlers have also traditionally been important raw materials for producing other artefacts.

Animal husbandry

Cattle, sheep/goat and domestic pig were found only at the market places Markkina and Pappila and at the site Autiokenttä. The composition of the refuse fauna at Autiokenttä is very similar to that at Silbojokk, a 17th-century silver mining community in northern Sweden (Sten 1989). Sten (1989) has interpreted the relatively high number of bone fragments from domestic species as evidence of meat used by the miners, not by the Saami. Cattle, sheep, goats and domestic pigs would have required shelter and fodder in the winter, which the Saami at Silbojokk did not supply at all or only to a restricted extent. The same reasoning could be applied to Autiokenttä. This area was first used by the Saami, but Finnish settlers had replaced them completely by the middle of the 19th century (Itkonen 1948a: 96–7). The bones from domestic species could derive from the settler's households, and the reindeer bones could derive from those of the Saami. On the other hand, according to Itkonen (1948b: 191) the Saami started building stock houses and converted to animal husbandry in the middle of the 18th century, just after the reindeer plague. At Autiokenttä, one dwelling has been interpreted as a possible animal shelter, since it lacks a fire place (Honkanen 1982).

The presence of cattle bones at the market places Pappila and Markkina could be interpreted as an indication of meat transported by the merchants from Tornio and other towns. However, the distribution of the different skeletal elements, that is, the presence of fragments of the skull and mandible in the material, indicates that whole carcasses were handled at the site. In Utsjoki, the inhabitants along the river Teno are known to have kept cattle and sheep in the 18th century (Itkonen 1948b: 194). Sheep bones have also been found at Saami *sieidi* sites (e.g. Harlin 2007; Harlin & Ojanlatva 2008). One sheep bone was found at a sacrificial site on the island of Ukonsaari in Inari and has been dated to the 14th century (Okkonen 2007). In the 17th century, the reindeer herding Saami traded sheep and

goats from the sea-based Saami and sometimes even butchered cattle (Hansen 2005: 177 and references within).

The distribution of the elements of sheep/goat is quite different from that of cattle; the sheep/goat bones found at the sites come almost entirely from meaty parts of the carcass. This may indicate that salted or smoked joints of sheep or goat were carried by traders. This is somewhat strange, since sheep or goats would have been much easier to take along to markets than cattle, and they also need less shelter and food. These were crucial factors, since both markets were held during the mid-winter. At Lycksele, only some fragments of sheep/goat have been identified (Zachrisson 1976: 83). According to Hambleton & Rowley-Conwy (1997) the predominant mode of subsistence at the medieval site Cæccevaj'njar', North Norway, was based on wild reindeer hunting and supplemented by sheep, seals, small mammals, birds, fish and whales. Here, the presence of sheep bones is suggested to represent milking animals, indicating that reindeer milking had been replaced by that of sheep.

Fur trade

Fur trade is known to have played a significant role in northern Fennoscandia, especially during the Iron Age and the Middle Ages (Mulk 1994 and references within). This led to the accumulation of wealth, which in turn, could be used for religious purposes, that is, as offerings (Carpelan 1992; Mulk 1994). Hunting fur-bearing animals, except for beavers, was traditionally an individual activity, whereas reindeer and beaver were hunted collectively (Carpelan 1991). Both hunting and the fur trade were concentrated in winter villages (Carpelan 1992; Mulk 1994).

Bones from fur-bearing animals are rare in all studied samples. The same phenomenon is seen in Lycksele and Silbojokk in Sweden (Ekman & Iregren 1984; Sten 1989). At the winter village of Nukkumajoki, only one mandible of a wolverine and one tibia of a pine marten were found, as well as some beaver bones. This is even less than in the summer village of Juikenttä. The material from Autiokenttä included one fragment of an ulna of a brown bear and some red fox bones. The only evidence of fur animals at the winter markets are the few red/Arctic fox and squirrel bones from Markkina, as well as one wolf bone, one beaver bone and two Arctic hare bones from Pappila. If furs were traded here, they were not prepared at the site but were brought to the market as finished products.

It is obvious that carnivores and other fur-bearing animals were not skinned and prepared at the sites or market places, but probably where they were caught.

A potential indication of the ritual use of animals in the excavated material is the nearly total absence of bear bones. This absence could be explained by the fact that the bear is a sacred animal for the Saami, and for that reason, bear carcasses and bones were treated and deposited in a special way (and were not deposited in villages and market places) (Myrstad 1996; Bäckman 2000; Edbom 2000).

Fowling

The bird sample from Juikenttä is large and represents the intensive use of bird resources in the area. The sample from Markkina is also large, but the number of identified species is clearly lower. The species diversity and the amount of bird bones are low at all other sites.

Here, it is important to note that the bird bones from Markkina have not been re-analyzed for this study. In the material from Markkina, 96 bones are from anatid birds, and 74 bones are from other birds that have not been identified by species. We cannot really compare these samples without a thorough osteological analysis. Furthermore, the sample size and excavation methods are significant factors affecting the composition of archaeological bone assemblages. Depending on the accuracy of sample recovery (mainly sieving and mesh-size), bones from small animals can be totally lost. It has also been shown by previous studies that taxonomic diversity rises with increased sample size (e.g. Mannermaa 2004; Ukkonen 2004).

In general, the species distributions at our study sites clearly reflect the seasons of use of the sites. The summer occupation site Juikenttä has a variety of local and migratory bird species, and the winter villages and winter market places have mainly local species. Markkina is an exception, such that both local *Lagopus* birds and anatid birds are numerous.

Almost exclusively bones of local bird species were identified in Nukkumajoki, Autiokenttä and Pappila (the only exception being two migratory anatid bones from Pappila). It is obvious that the main reason for the low species diversity and scarcity of bird bones in Nukkumajoki is that this site was used during the winter-time when most of the migratory birds are absent. Relative to the other sites, Pappila and Markkina, the two winter market places, have many *Lagopus* bones, and these materials also have similar anatomical distributions within this bird group, indicating that complete birds were handled at these sites. The abundance of the *Lagopus*-birds at the winter markets is not surprising as these birds were mainly hunted in the winter with traps and snares and were very valuable items to sell during the winter (Fellman 1907; Itkonen 1948b: 43–4). Interestingly, mid-sized anatids are more common than the *Lagopus*-birds in Markkina. Additionally, geese are present, indicating occupation of this site during the season when migratory birds were available.

In contrast to the market places of Pappila and Markkina, the genus *Lagopus* is scarce at Juikenttä and totally lacking at Autiokenttä and Nukkumajoki. This is interesting in the light of the importance of this genus and especially that of the willow grouse for the people living in Lapland during the 19th and 20th centuries (Itkonen 1948b: 7) during which willow grouse was the most important game bird in Lapland, and the capercaillie the second. This discrepancy may be explained by the differences in the season of occupation of the sites and by the fact that willow grouse was not always considered to be a delicacy among the Saami (Fellman 1906: 440, 491). On the other hand, grouse feathers were a sellable item, which explains the presence of bird bones at the market places (Itkonen 1948a: 44). In Norway, during the 17th century, reindeer herding Saami paid their taxes to the crown in the form of reindeer fur related products, such as fur boots and mittens, but also with feathers (Hansen 2005: 176).

The bird species identified and the presence of bones from young swans and geese at Juikenttä clearly indicates the use of the site in the spring, summer and early autumn (most migratory species arrive to Lapland for breeding time in summer and leave for their wintering areas after breeding). Use during the summer season also explains the high number of bird bones and

identified species. Itkonen (1948b: 32) reports that water birds (in particular, geese) were so important for the Skolt Saami people that moving from the winter villages to the summer villages was done just before their arrival.

Apart from the very small number of bones from the genus *Lagopus*, the taxonomic distribution of the birds in the materials from Markkina and Juikenttä somewhat resemble the bird material obtained from the 17th-century early-modern town of Tornio (Southern Lapland). Here, the *Lagopus* species and capercaillie are very common, followed by swans and geese (Puputti 2009). Some similarities can be seen in the distribution of species at Juikenttä and Lycksele. However, one clear difference is the abundance of the whooper swans and geese at Juikenttä and the absence of these bird groups in Lycksele (Zachrisson 1976; Ekman & Iregren 1984).

Capercaillie are present at some sites but totally absent at others, and black grouse is present only at Juikenttä. We could explain that the differences in the abundances of these large grouse-species are due to the season of the use of the site and that these forest birds may not have been very common in all parts of Lapland. On the other hand, capercaillie bones are commonly found in *sieidi* sites (e.g. Harlin 2007; Harlin & Ojanlatva 2008). Along with capercaillies also whooper swans seem to be the typical bird species found at sacrificial sites (Harlin 2007; Okkonen 2007; Harlin & Ojanlatva 2008; Mulk 2009; Äikäs et al. 2009). Both are abundant at Juikenttä and at the sacrificial site at Viddjavárri in northern Sweden (1000–1100 AD; Mulk 2009).

The occasional finds of crane (*Grus grus*), the great cormorant (*Phalacrocorax carbo*) and the Northern goshawk (*Accipiter gentilis*) at Juikenttä might have been consumed or they may have had some other uses. Based on ethnographic sources, the attitude towards eating cranes varies among the Saami of different areas (Itkonen 1948b: 36, 370; Paulaharju 1961: 118–9), and even hawks were eaten at times. Also divers were sometimes eaten (Itkonen 1948a: 507; Itkonen 1948b: 50), but perhaps more importantly, their skins and feathers were used in the making of bags and pouches (e.g. Kielatis 2000). All bird species identified at Juikenttä might have been locally hunted. The great cormorant may have lived near the Arctic Ocean, or it may be one of the great cormorants occasionally observed inland (BirdLife at https://www.tiira.fi/ mentions 106 observations of cormorants in Lapland during the period 1.1.2016–31.12.2016).

The distribution of skeletal elements at the two largest sample sites (Juikenttä and Markkina) can be used to interpret the bird carcass treatment at these sites. At Juikenttä, a scarcity of scapulae is evident. Otherwise, the relatively even anatomical distribution of the various parts of the skeletons of all bird groups indicates the deposition of complete birds at these sites.

Fishing

Based on the available refuse fauna, it is difficult to estimate the importance of fishing for the livelihoods of the Saami. All sites are situated near rivers and lakes, and it can be assumed that fish were caught and consumed as they are today. Salmonid fish were an important economic resource, as indicated by the material from the Pappila market place in Utsjoki, near the River Teno. Cod bones at both market places (Pappila and Markkina) probably derive from dried fish, since there are practically no elements from the

head regions of cod skeletons among the refuse. The fish may have been brought to the market place for sale or as provisions. The importance of dried fish for the expansion of Sweden has also been emphasized by Itkonen (1948b: 248). According to Fellman (1907), however, half of the salmon caught in the River Teno was eaten by the Saami themselves.

Conclusions

Our material derives from winter market places and winter and summer villages in Finnish Lapland. In general, reindeer (wild or semi-domestic) remains dominate the excavated materials, which is a typical feature of many Saami sites. The species distributions are strongly affected by the seasonality of the sites; the sites used in the summer have a larger variety of species than the sites that were used during the winter. This pattern in bone materials is typical for samples from Saami societies, whose way of life is characterized by seasonal activities and movements.

The anatomic distribution of the reindeer bones indicates a highly economical use of the carcasses, especially the utilization of bone marrow by splitting the bones. It is not possible to use this material to infer whether the utilized reindeer were semi-domestic or wild. In addition to reindeer hunting and herding, animal husbandry was part of the livelihood of medieval to early modern Saami, albeit on a smaller scale.

The low number of fur animal bones at our study sites is somewhat surprising since hunting for, using and selling furs are known to have been practised by the Saami, according to ethnographic literature. Winter market places were the typical places to sell fur and feather items. Based on the material found at the market sites, these resources were not prepared on site but were brought to the market as final products.

Fowling, especially the snaring of tetraonid birds, was an important part of the Saami livelihood. Birds seem to have been brought to the sites and utilized as complete carcasses. Fish are found at all sites. The scarcity of the identified salmonid fish may be an artefact, since vertebrae were not always identified by species. At both market places, dried cod was utilized and was certainly also sold.

One indication of rituals could be the scarcity of antlers in the studied bone assemblages. In some cases these elements have been deposited to a sacred site and therefore they are not present in a settlements. However, antlers were also used as raw materials to produce artefacts, so the lack of antlers can not self-evidently refer to sacrifices.

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